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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,843	03/16/2004	Michael Francis Xavier Gigliotti JR.	130445-1	3108

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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EXAMINER	
AUSTIN, AARON	
ART UNIT	**PAPER NUMBER**
1775	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/801,843	GIGLIOTTI ET AL.	
	Examiner	Art Unit	
	Aaron S. Austin	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20,22-36,68-76 and 79-81* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20,22-36,68-76 and 79-81* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 20 and 22-35 are rejected under 35 U.S.C. 102(b) as being anticipated by European Patent Application No. 1,054,077 A2 (EP '077).

EP '077 teaches a titanium alloy article, such as a turbine blade, comprising a protective coating 20 of austenitic stainless steel over the blade 10 and an oxide layer 22 over the protective coating (abstract). The coating has greater toughness and ductility and improved ductile to brittle transition temperatures as well as reduced diffusion rates (paragraph [0034]). An intermediate (barrier) layer 24 is used to further inhibit diffusion between the turbine blade substrate and the outer protective coating wherein the intermediate layer can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5). The protective coating may be applied by any of a number of

methods including plasma spraying, cladding (extruding), hot isostatic pressing, electroplating, and chemical vapor deposition (paragraph [0036]).

Regarding claim 22, the intermediate layer can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5).

Regarding claim 23, the substrate is a titanium-based alloy (paragraph [0031]).

Regarding claim 24, the protective coating comprises austenitic steel (paragraph [0034]), a shape memory iron-based alloy.

Regarding claims 25-27, the protective coating exhibits an austenite phase, superelastic phase, and martensite phase as claimed as like materials are used in a like manner to the claims.

Regarding claim 28, the substrate comprises a titanium alloy article such as a fan blade (paragraph [0027]).

Regarding claim 29, the diffusion barrier layer prevents interdiffusion between the substrate and the protective coating (paragraph [0039]).

Regarding claims 30-32, the coating may further comprise hard particles in the form of nitrides (paragraph [0046]).

Regarding claims 33-35, alternating layers of the protective layer and titanium may be used (paragraph [0045]) along with the oxide/nitride containing layers (paragraph [0046]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 36, 68-76 and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Application No. 1,054,077 A2 (EP '077).

EP '077 teaches titanium alloy article as described above, but does not specify the size and shape of the titanium alloy article. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the size of the titanium alloy article for the intended application, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984). Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the shape of the titanium alloy article for the intended application, since it has been held that the configuration was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration claimed was significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). Further, application as an insert is considered intended use.

Regarding claim 69, the protective coating comprises austenitic steel (paragraph [0034]), a shape memory iron-based alloy.

Regarding claims 70-72, the coating may further comprise hard particles in the form of nitrides (paragraph [0046]).

Regarding claims 73-75, alternating layers of the protective layer and titanium may be used (paragraph [0045]) along with the oxide/nitride containing layers (paragraph [0046]).

Regarding claims 36 and 76, EP '077 teaches a titanium alloy article as described above, but does not specify the size of the grains used in the composite. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the particle size for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 79, the intermediate layer can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5).

Claims 36 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over European Patent Application No. 1,054,077 A2 (EP '077) in view of Coulon (US Patent No. 4,832,993).

In addition to the argument set forth above, EP '077 does not specify the size of the grains used in the composite.

Coulon teaches a grain size of 0.5 micrometers or less in the coating of a turbine blade surface using a laser technique including projecting a powder onto the substrate under a laser beam (column 2, lines 28-35). The laser application process is substantially similar to the application process used by EP '077 to apply the composite coating (paragraphs [0045]-[0046]). Therefore, as Coulon clearly teaches a grain size overlapping the claimed range provides the advantage of suitability for coating a turbine component, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use a grain size as taught by Coulon in the laser application of the composite coating taught by EP '077 (paragraphs [0045]-[0046]). Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Claim 20, 22-31, 36, 68-71, 76, and 79-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gessinger et al. (US Patent No. 4,380,574) in view of European Patent Application No. 1,054,077 A2 (EP '077).

Gessinger et al. teach a high-damping composite material consisting of a metal or metal alloy base, such as a steel, super alloy, titanium alloy, etc. (column 2, lines 62-66), which determines the strength and shape of the material and a metal or metal alloy surface layer, such as a memory alloy (column 3, lines 5-24) of which NiTi is an example (column 4, line 63), surrounding the base material. The surface layer may be applied by electrolytic or other means, such as plasma spraying and dense-sintering (column 4, lines 34-48). A diffusion barrier layer may be used between the base and

the surface layer (column 4, lines 48-55). The surface layer material undergoes an austenite-martenistic phase transition (column 4, lines 58-61).

Gessinger et al. do not teach the composition of the diffusion barrier layer.

EP '077 teaches an intermediate (barrier) layer used to further inhibit diffusion between a turbine blade substrate and a outer protective coating wherein the intermediate layer can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5). Therefore, as EP'077 clearly teaches a diffusion layer comprising elements as claimed provides the advantage of inhibiting diffusion between an alloy and a protective layer, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use the diffusion layer taught by EP'077 as the diffusion layer taught by Gessinger et al. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Regarding claim 22, the intermediate layer of EP '077 can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5).

Regarding claim 23, the substrate is a steel, super alloy, titanium alloy, etc. (column 2, lines 62-66).

Regarding claims 24 and 69, the surface layer is a memory alloy (column 3, lines 5-24) of which NiTi is an example (column 4, line 63).

Regarding claims 25-27, the surface layer material undergoes an austenite-martenistic phase transition (column 4, lines 58-61). Further, the protective coating

exhibits an austenite phase, superelastic phase, and martensite phase as claimed as like materials are used in a like manner to the claims.

Regarding claim 28, the substrate comprises a turbine blade (column 5, line 47).

Regarding claim 29, a diffusion barrier layer may be used between the base and the surface layer to prevent interdiffusion of layer components (column 4, lines 48-55).

Regarding claims 30-31 and 70-71, the shape memory alloy may be a composite including further hard additions (column 4, line 65).

Regarding claims 36 and 76, EP '077 teaches a titanium alloy article as described above, but does not specify the size of the grains in the composite used. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the particle size for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 68, Gessinger et al. in view of EP '077 teach an article as described above, but do not specify the size and shape of the titanium alloy article. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the size of the titanium alloy article for the intended application, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984). Further, it would have been obvious to one having ordinary skill in the art at the time the invention was

made to adjust the shape of the titanium alloy article for the intended application, since it has been held that the configuration was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration claimed was significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). Further, application as an insert is considered intended use.

Regarding claim 79, the intermediate layer of EP '077 can be selected from a wide variety of metals (including niobium), nitrides, and oxygen-containing compounds such as silica (line 56 in column 4 to line 11 in column 5).

Regarding claim 80, Gessinger teaches NiTi type memory alloys which may contain additional alloying elements (column 3, lines 20-24). As Fe and Cr are common alloying elements, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the claimed alloys.

Regarding claim 81, EP '077 teaches its diffusion barrier layer as comprising niobium (column 5, line 4).

Claims 36 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gessinger et al. (US Patent No. 4,380,574) in view of European Patent Application No. 1,054,077 A2 (EP '077), and further in view of Sue et al. (US Patent No. 4,839,245).

In addition to the argument set forth above, Gessinger in view of EP '077 does not specify the size of the grains used in the composite.

Sue et al. teach it is known to use a grain size of 0.2 to 0.5 micrometers in the manufacture of spray cast coatings for turbine components (column 1, lines 46-47). The surface layer of Gessinger may be applied by electrolytic or other means, such as

plasma spraying and dense-sintering (column 4, lines 34-48). Therefore, as Sue et al. clearly teach a grain size overlapping the claimed range provides the advantage of suitability for spray coating a turbine component, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use a grain size as taught by Sue et al. in the spray application of the composite coating taught by Gessinger in view of EP '077. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Claims 80-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gessinger et al. (US Patent No. 4,380,574) in view of European Patent Application No. 1,054,077 A2 (EP '077), and further in view of Gowda et al. (US Patent No. 7,093,423).

In addition to the argument set forth above, Gessinger et al. in view of EP '077 teach a high-damping composite material as described above, but do not specifically teach the NiTi type memory alloy as comprising one of NiTiCr and NiTiFe.

Gowda et al. teach NiTiFe as a shape memory alloy suitable for use in turbine engine components (column 4, line 30). Therefore, as Gowda et al. clearly teach a NiTiFe is a memory alloy suitable for use in turbine engine components, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use the NiTiFe memory alloy of Gowda et al. as the NiTi type alloy taught by Gessinger et al. in combination with the buffer of EP '077. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Regarding claim 81, EP '077 teaches its diffusion barrier layer as comprising niobium (column 5, line 4).

Response to Arguments

Applicant's arguments, see the Remarks, filed 1/24/07, with respect to the rejection(s) of claim(s) 20, 23-30, and 80 under 102(b) have been fully considered and are persuasive, particularly with respect to the teachings of Gessinger as to the content of the disclosed diffusion barrier layer. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of EP '077.

Applicant's arguments filed 1/24/07 have been fully considered but they are not persuasive.

With regard to the Gessinger reference, applicant argues the reference does not provide a description of the properties of the diffusion layer claimed. Applicant provides a description of the claimed properties of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or substrate at paragraph [0039] of the specification. Exemplary but non-limiting examples are given as being Nb, Hf, Ta, and Zr. As the properties are not further defined, they must be interpreted as provided by the applicant. As all solid metals have some level of brittleness due to hardness and as the term "low melting phase" is undefined as to what temperatures qualify as low melting, it is the Examiner's

position that a diffusion layer as taught by EP '077 in use as the diffusion barrier layer of Gessinger will have the claimed properties. This position is supported further with respect to the low melting phase requirement in that the diffusion barrier layer of Gessinger necessarily has heat resistance in use in thermal machine components and is therefore interpreted as being resistant to low temperature melting.

Applicant further argues the term "brittle" does not apply to the layers formed as the substance of the present rejection. Applicant provides a recitation from wikipedia.org in support of this argument. This argument is not found to be convincing for several reasons. First, the recitation of a definition from wikipedia.org, a website wherein information can be changed by any user, is not found to be convincing due to its ability to be altered. Second, like materials are used in the rejection in a like manner to the claims, thus qualities such as brittleness are expected to be the same. Third, the term "brittle" is a relative term as it is not measured scientifically but rather used comparatively to determine the ease of fracture.

With regard to the EP '077 reference, applicant argues EP '077 does not describe a shape memory alloy, erosion resistance, and or avoidance of brittle and/or low melting phases between the diffusion controlling layer and a substrate and an erosion protective coating comprising a shape memory allow. The argument acknowledges that AP '077 teaches a barrier layer positioned between a titanium alloy structure and an austenitic steel (a shape memory alloy), but concludes that the diffusion barrier layer is not used in the context of erosion protection of a shape memory

alloy. However, as like materials are used in a like manner as claimed, the shape memory alloy layer is expected to provide erosion resistance. In fact, as the diffusion barrier layer serves to prevent interdiffusion between the layers that may result in the formation of undesirable phases (paragraph [0040]), the layered structure lends itself to erosion resistance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron S. Austin whose telephone number is (571) 272-8935. The examiner can normally be reached on Monday-Friday: 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ASA

JENNIFER MCNEIL
SUPERVISORY PATENT EXAMINER
2/12/07